

Thermophilic bacteria from an Australian geothermal aquifer - a culture-independent analysis

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The discovery of a deep subsurface microbial biosphere has expanded the range of environments known to be suitable for life. Detailed studies of this subsurface biota has direct implications for the search for extinct or extant life on Mars as well as providing insights into the origin and evolution of life on Earth. The Great Artesian Basin (GAB) is a large underground aquifer situated in North-Eastern Australia. It covers an area of 1.7 million km², has a maximum depth of 3 km, and is estimated to contain 8,700 megalitres of water. The artesian waters are geothermally heated (approaching boiling temperature at bores), and are believed to take two million years to traverse the basin.

A small number of bacterial species have been cultured from the GAB waters. However, no culture-independent analysis of the bore waters has been published. We performed a molecular study of the bacteria present in a GAB water sample (77°C, pH 7.5) from the Cannuwaikaninna bore (South Australia). Microorganisms present in the sample were collected by filtration, total genomic DNA was extracted, and a 16S rRNA library constructed using generic bacterial PCR primers. A total of 75 recombinants were analysed by restriction fragment length polymorphism, and the SSU RNA genes of selected ribotypes were sequenced. The majority of sequences displayed approximately 90% homology to the SSU rRNA gene of *Thermoanaerobacter* spp. and *Desulfotomaculum* spp. It is generally agreed by microbiologists that this level of similarity suggests that the dominant species may be a new thermophilic genus.